



# Salt River & Verde River Watersheds Water Supply Update



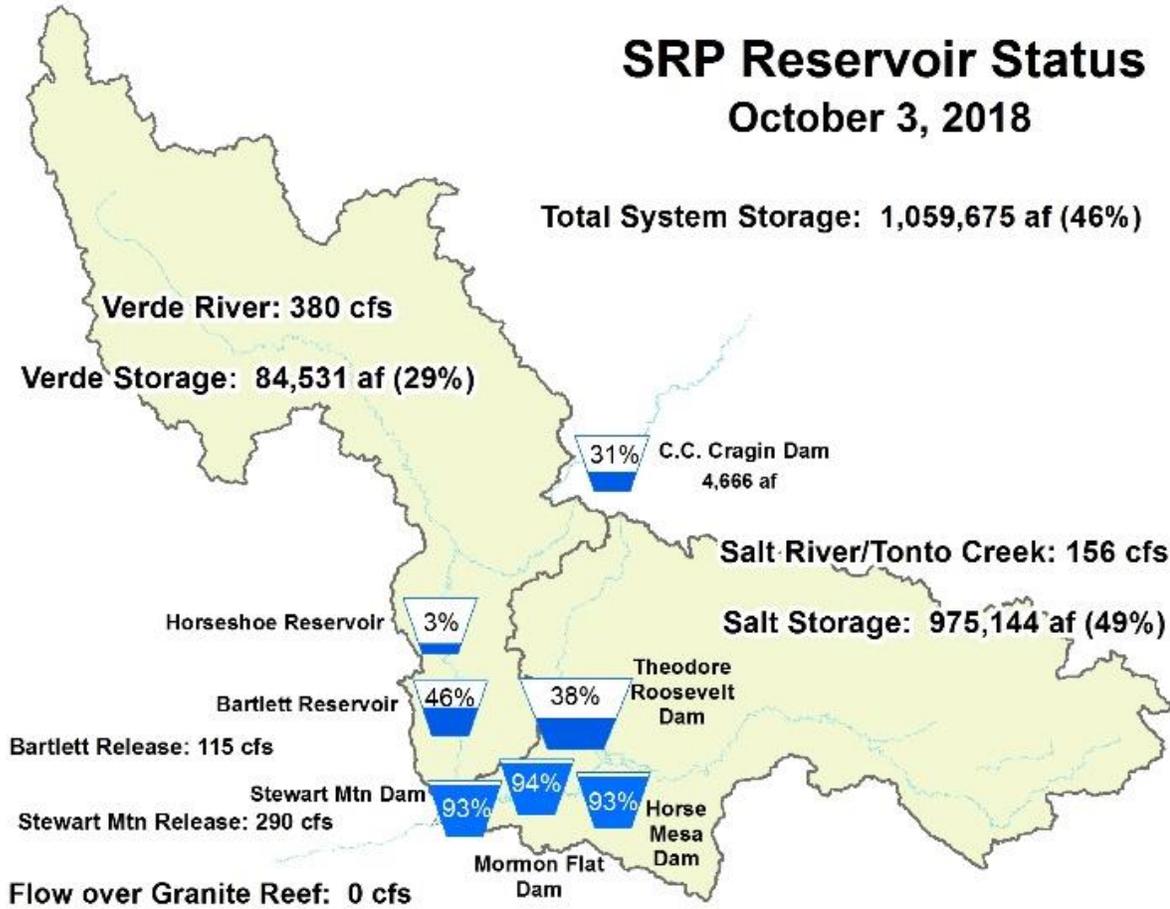
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Stephen Flora, Senior Hydrologist  
ADWR Drought ICG Meeting - November 12, 2019

# SRP Reservoir Status

October 3, 2018

Total System Storage: 1,059,675 af (46%)



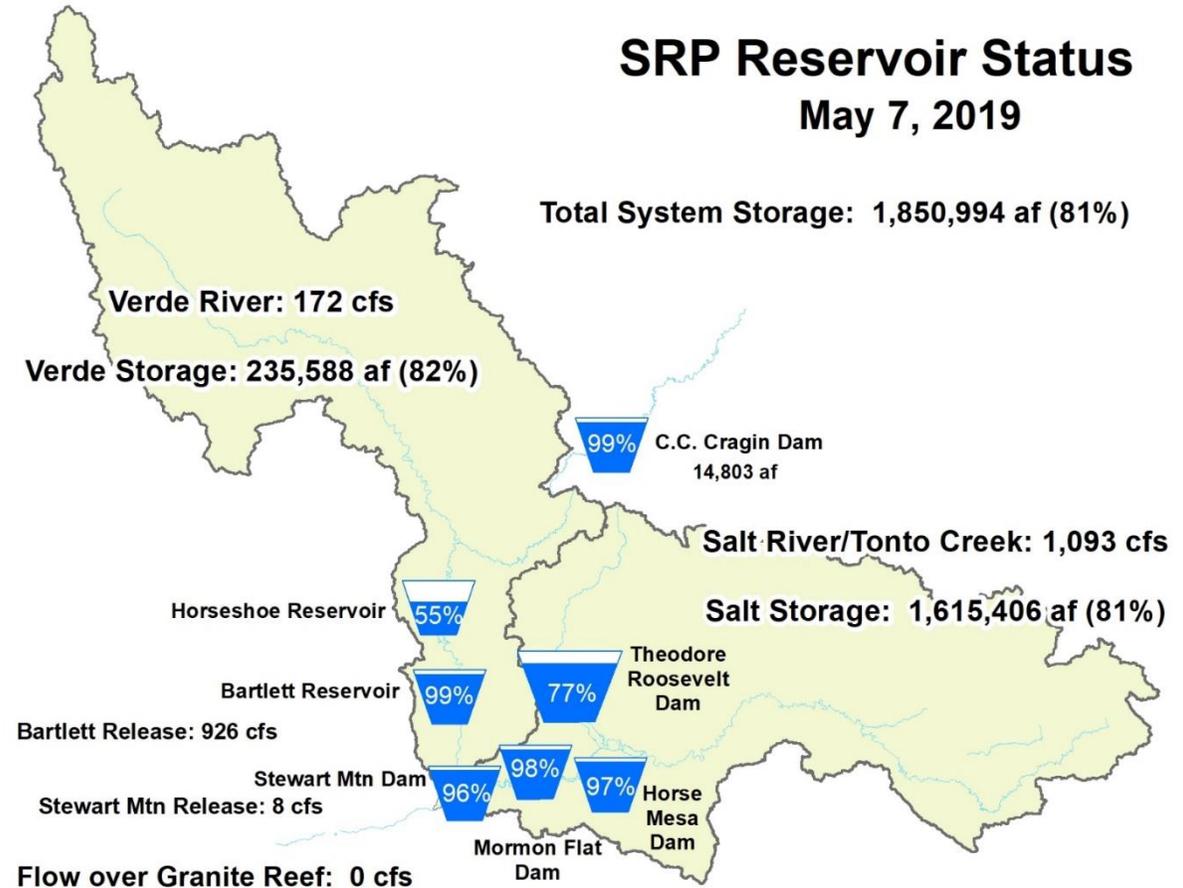
Prior to Winter 2019 – SRP Reservoirs at 46%

After Winter 2019 – SRP Reservoirs at 81%

# SRP Reservoir Status

May 7, 2019

Total System Storage: 1,850,994 af (81%)



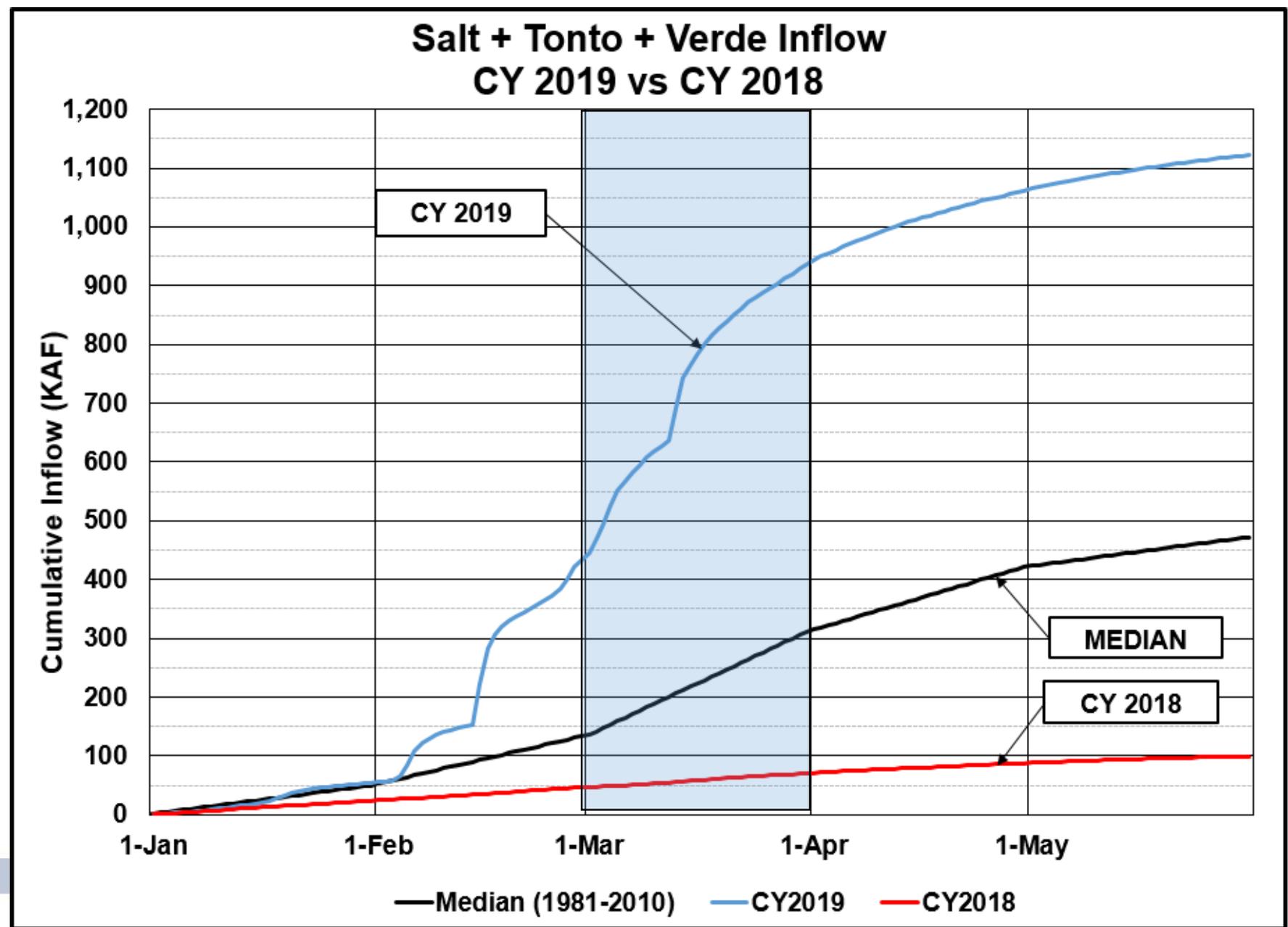
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### Jan-May Winter Inflows

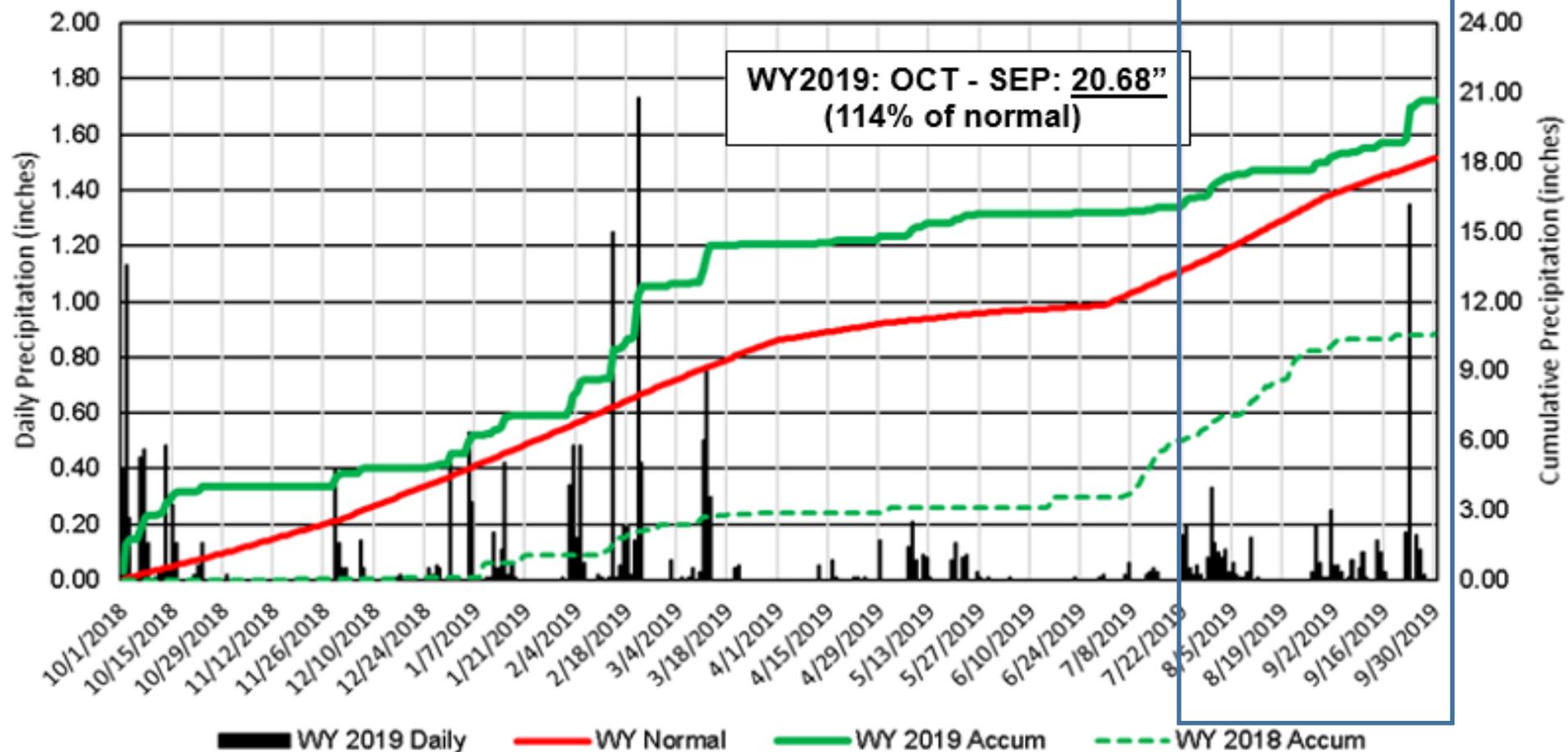
2018 – 100,000 AF  
(17% of median)

2019 – 1,121,000 AF  
(210% of median)

March 2019  
100,000 AF spilled from  
Verde Reservoirs  
due to full capacity



## Cumulative Watershed Precipitation: Water Year (Oct 2018 - Sep 2019)



**OCT – NOV**  
**4.54"**  
**+1.95"**

**DEC – MAR**  
**9.95"**  
**+2.22"**

**APR – JUN**  
**1.35"**  
**-0.17"**

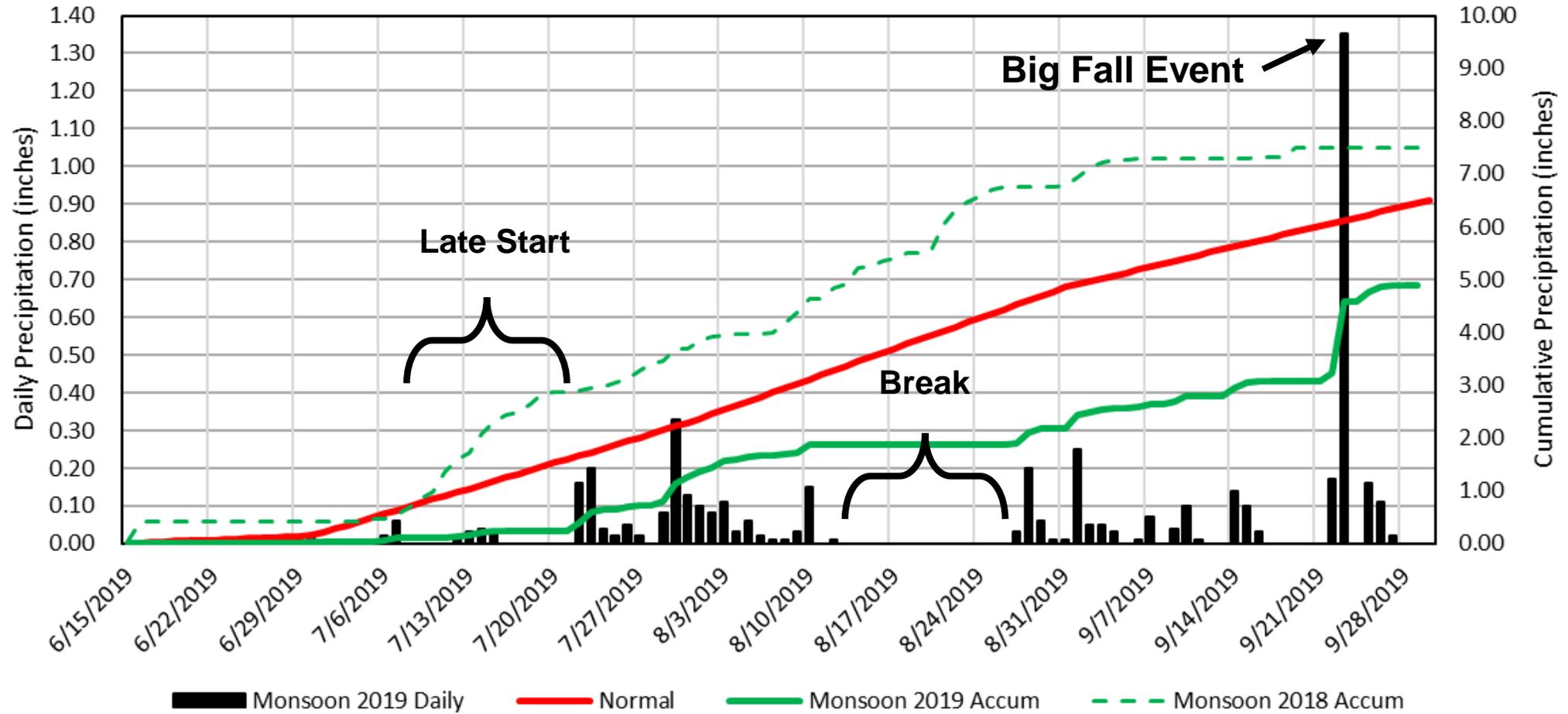
**JUL – SEP**  
**4.84"**  
**-1.52"**



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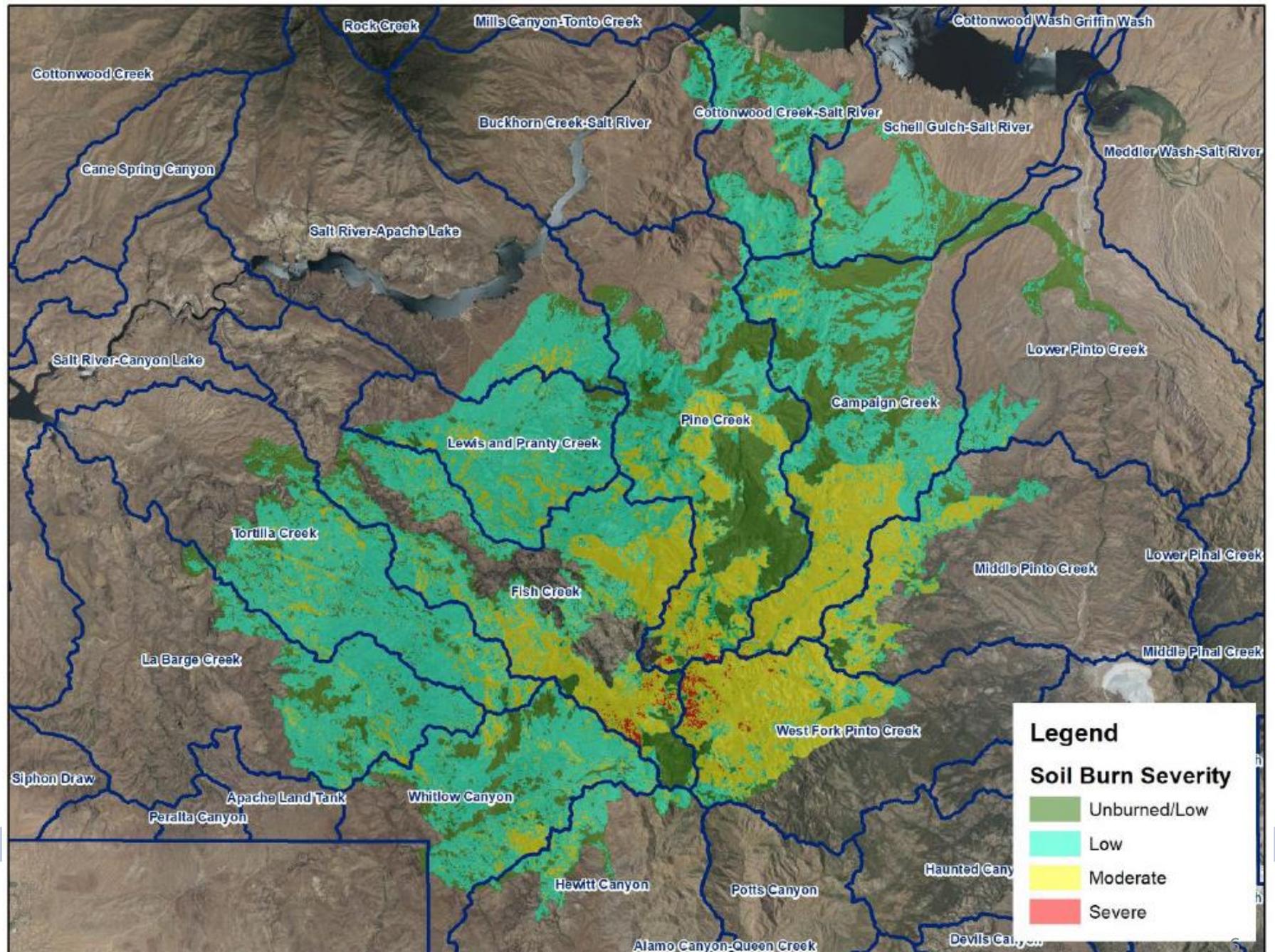
# Monsoon 2019

## Cumulative Watershed Precipitation: Monsoon (Jun 15- Sep 30)

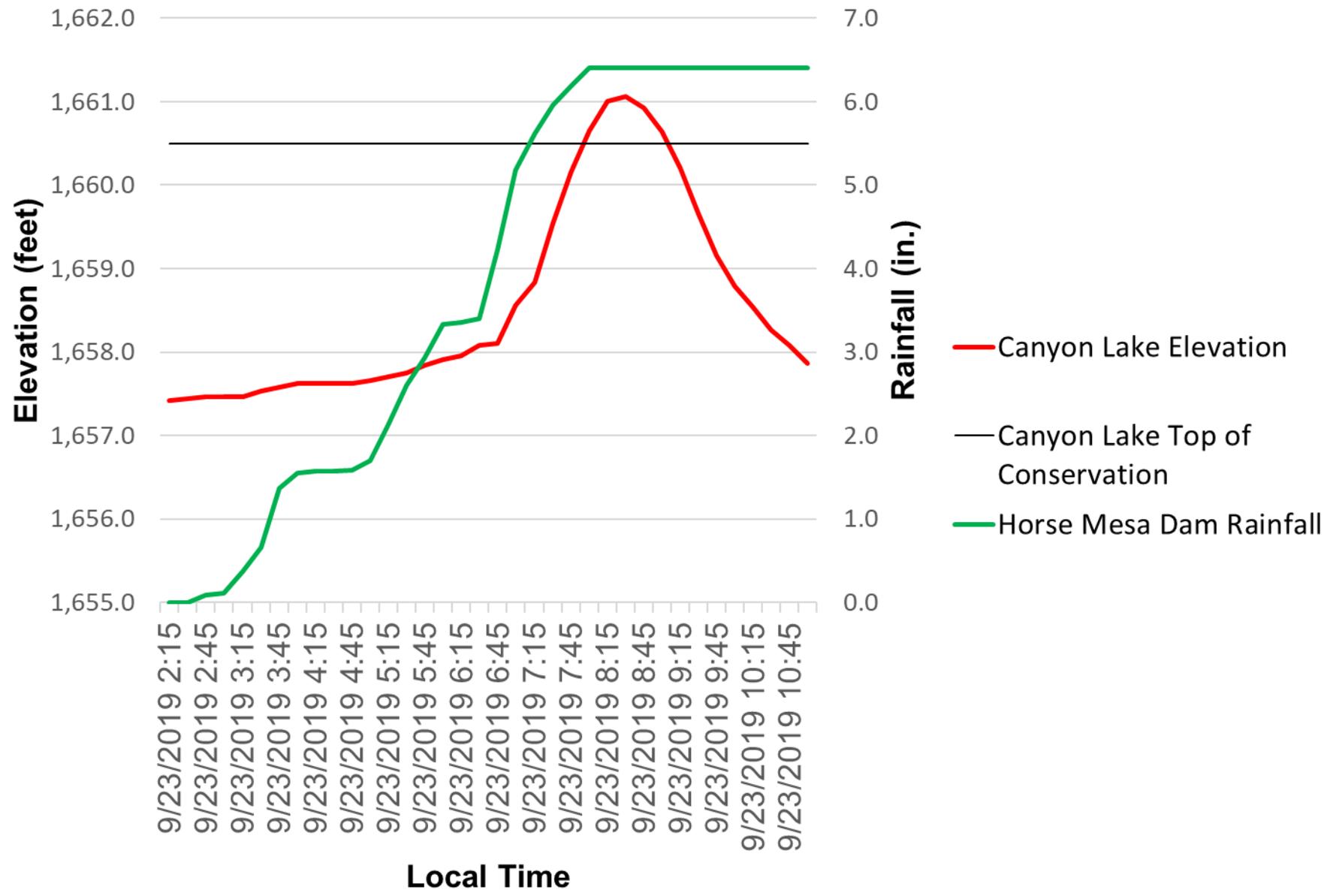


Map Courtesy of Tonto National Forest, Kelly Mott Lacroix

No significant flood events had been detected or reported until September 23 flood event.

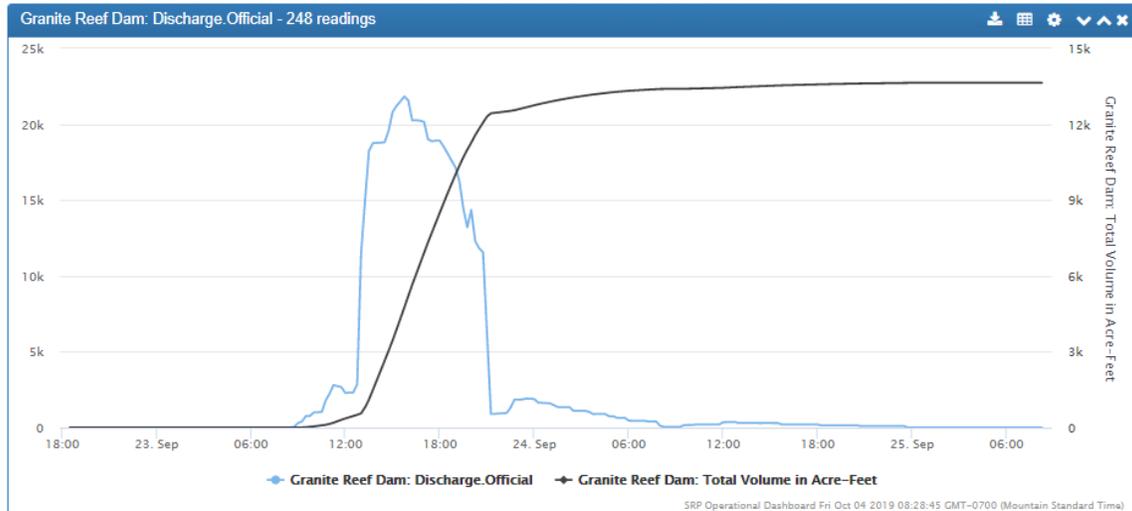


### Rainfall and Lake Elevation on 23 Sep. 2019 2:15 AM to 10:45 AM



# September 23<sup>rd</sup> Storm Impacts

- Observed 6-8" of precipitation in the lower Salt watershed resulting in releases from Stewart Mountain Dam up to 48,000 cfs
- Sycamore Creek flows of over 7,000 cfs contributed to higher flows along the lower Verde River
- Total volume of 13,635 af spilled over Granite Reef Dam (peak flow of 22,000 cfs)

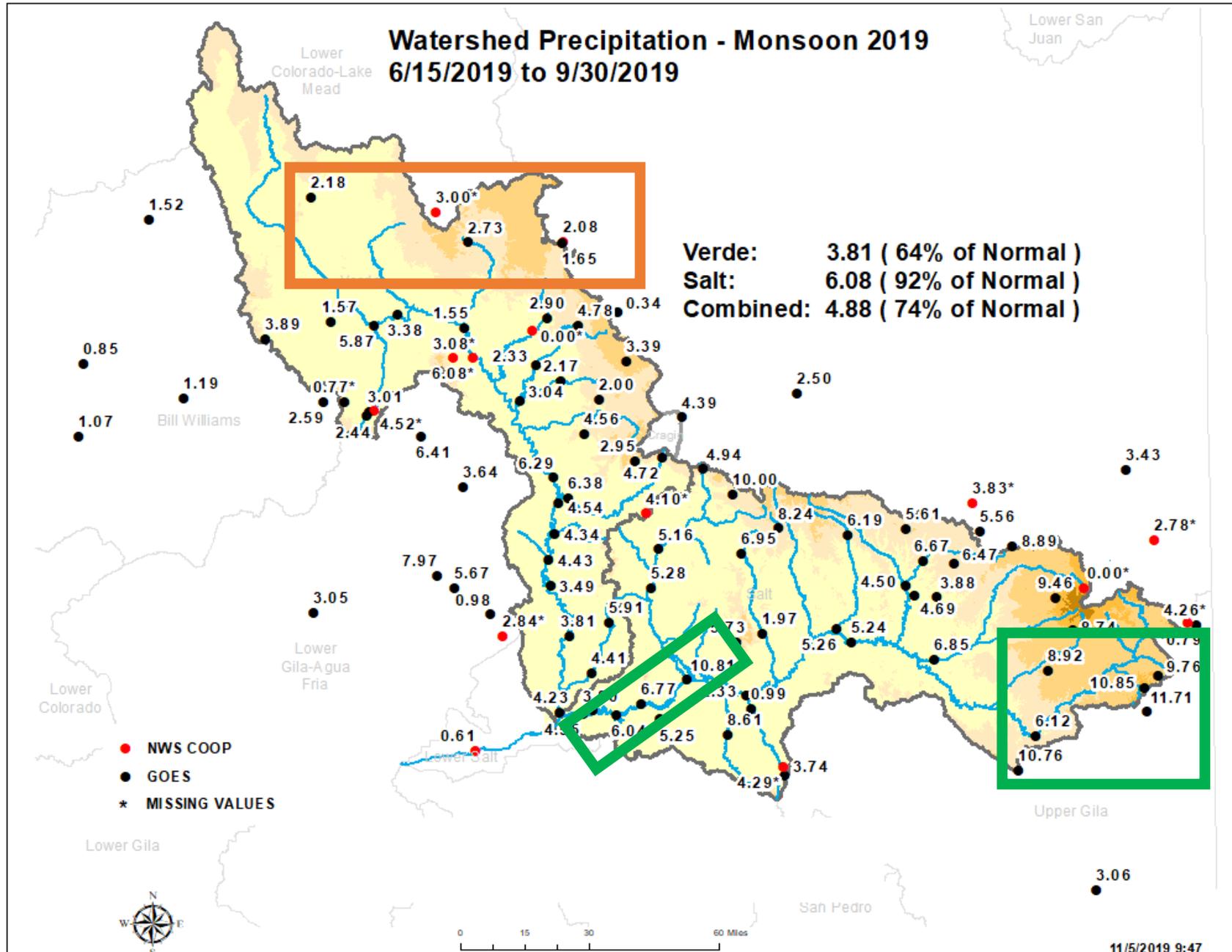


Water Spilled over Granite Reef Dam – September 23-24, 2019



Stewart Mountain Dam Releases – September 23, 2019

# Monsoon 2019





# Monsoon 2019 Rainfall Summary



June 15 – September 30

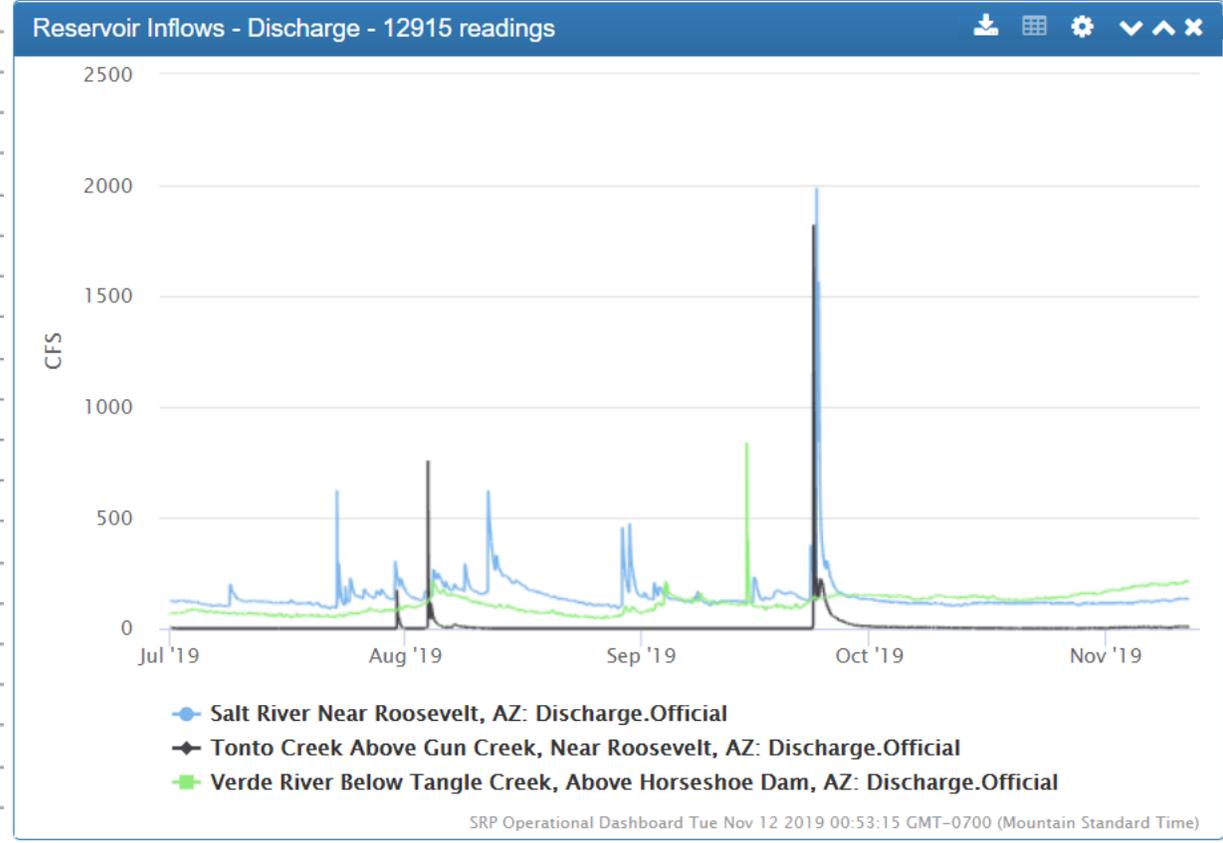
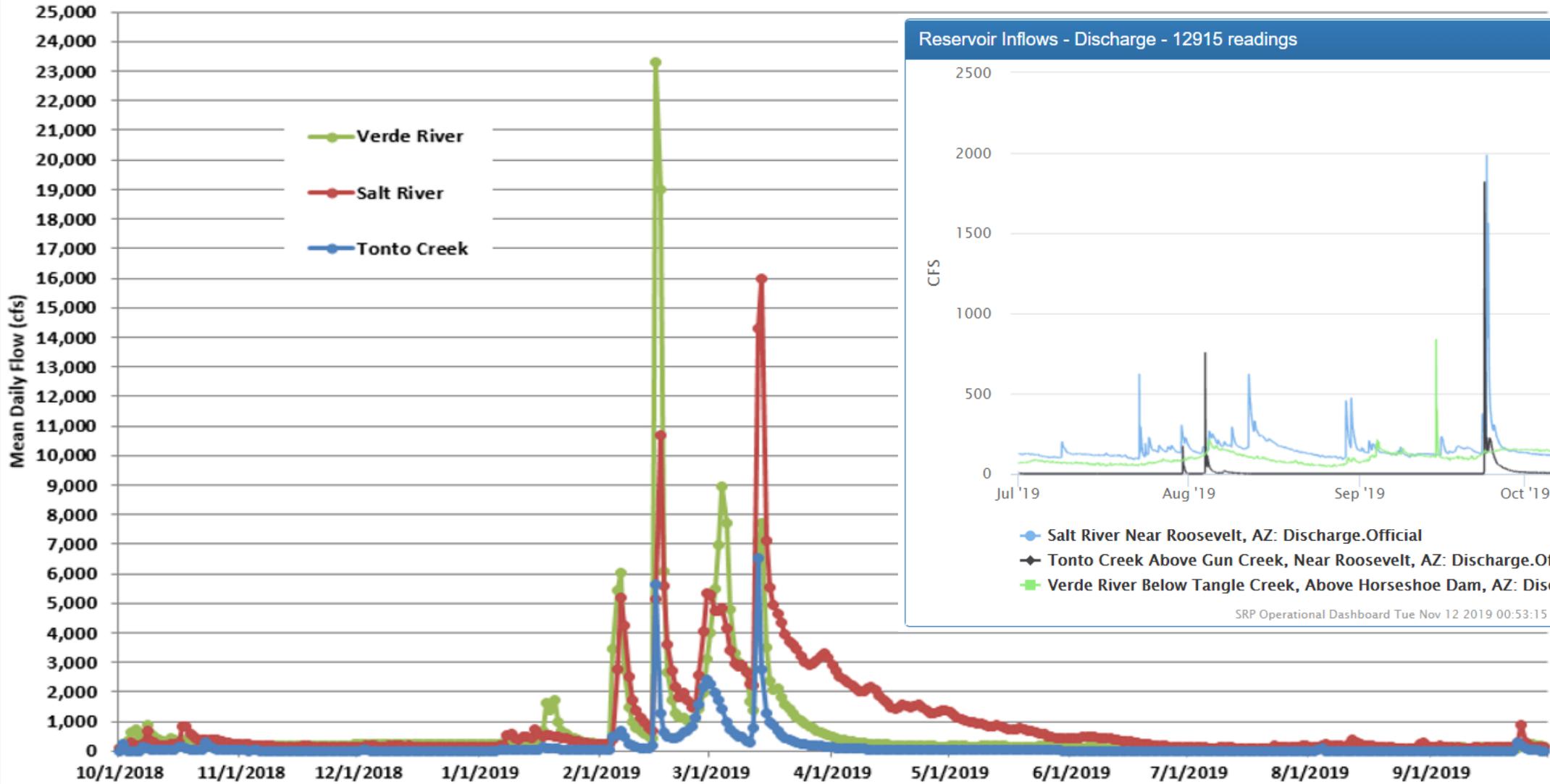
Location	Observed Precipitation (in)	Normal Precipitation (in)	Departure From Normal (in)	Percent of Normal	All-Time Ranking (Period of Record)
Bagdad	1.77"	5.36"	-3.59"	33%	4 <sup>th</sup> Driest (1925-2019)
Bellefont	3.03"	7.86"	-4.83"	39%	Driest on Record (1994-2019)
Bright Angel Ranger Station	1.59"	6.75"	-5.16"	24%	2 <sup>nd</sup> Driest (1925-2019)
Flagstaff Airport	2.08"	8.31"	-6.23"	25%	Driest on Record (1898-2019)
Grand Canyon Airport	1.72"	5.93"	-4.21"	29%	Driest on Record (1997-2019)
Jerome	7.34"	7.33"	+0.01"	100%	51 <sup>st</sup> Wettest (1897-2019)
Page Airport	0.63"	2.18"	-1.55"	29%	2 <sup>nd</sup> Driest (1957-2019)
Payson	4.63"	7.52"	-2.89"	62%	8 <sup>th</sup> Driest (1940-2019)
Phantom Ranch	0.45"	3.54"	-3.09"	15%	Driest on Record (1935-2019)
Prescott (Sundog Water Plant)	4.52"	7.96"	-3.44"	57%	16 <sup>th</sup> Driest (1898-2019)
Prescott Airport	3.50"	6.51"	-3.01"	54%	13 <sup>th</sup> Driest (1948-2019)
Saint Johns Airport	2.93"	5.99"	-3.06"	49%	4 <sup>th</sup> Driest (1999-2019)
Seligman	1.00"	5.57"	-4.57"	18%	4 <sup>th</sup> Driest (1904-2019)
Show Low Airport	3.83"	7.59"	-3.76"	50%	Driest on Record (1984-2019)
Sunset Crater Natl Mon	3.17"	7.93"	-4.76"	40%	3 <sup>rd</sup> Driest (1969-2019)
Tec Nos Pos	0.77"	3.19"	-2.42"	24%	Driest on Record (1962-2019)
Walnut Canyon Natl Mon	2.71"	8.15"	-5.44"	33%	3 <sup>rd</sup> Driest (1910-2019)
Williams	3.73"	8.32"	-4.59"	45%	5 <sup>th</sup> Driest (1897-2019)
Window Rock	4.65"	5.73"	-1.08"	81%	7 <sup>th</sup> Driest (1998-2019)
Winslow	1.42"	3.23"	-1.81"	44%	5 <sup>th</sup> Driest (1915-2019)
Wupatki Natl Monument	1.28"	3.89"	-2.61"	33%	3 <sup>rd</sup> Driest (1940-2019)



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Graphic by NWS Flagstaff

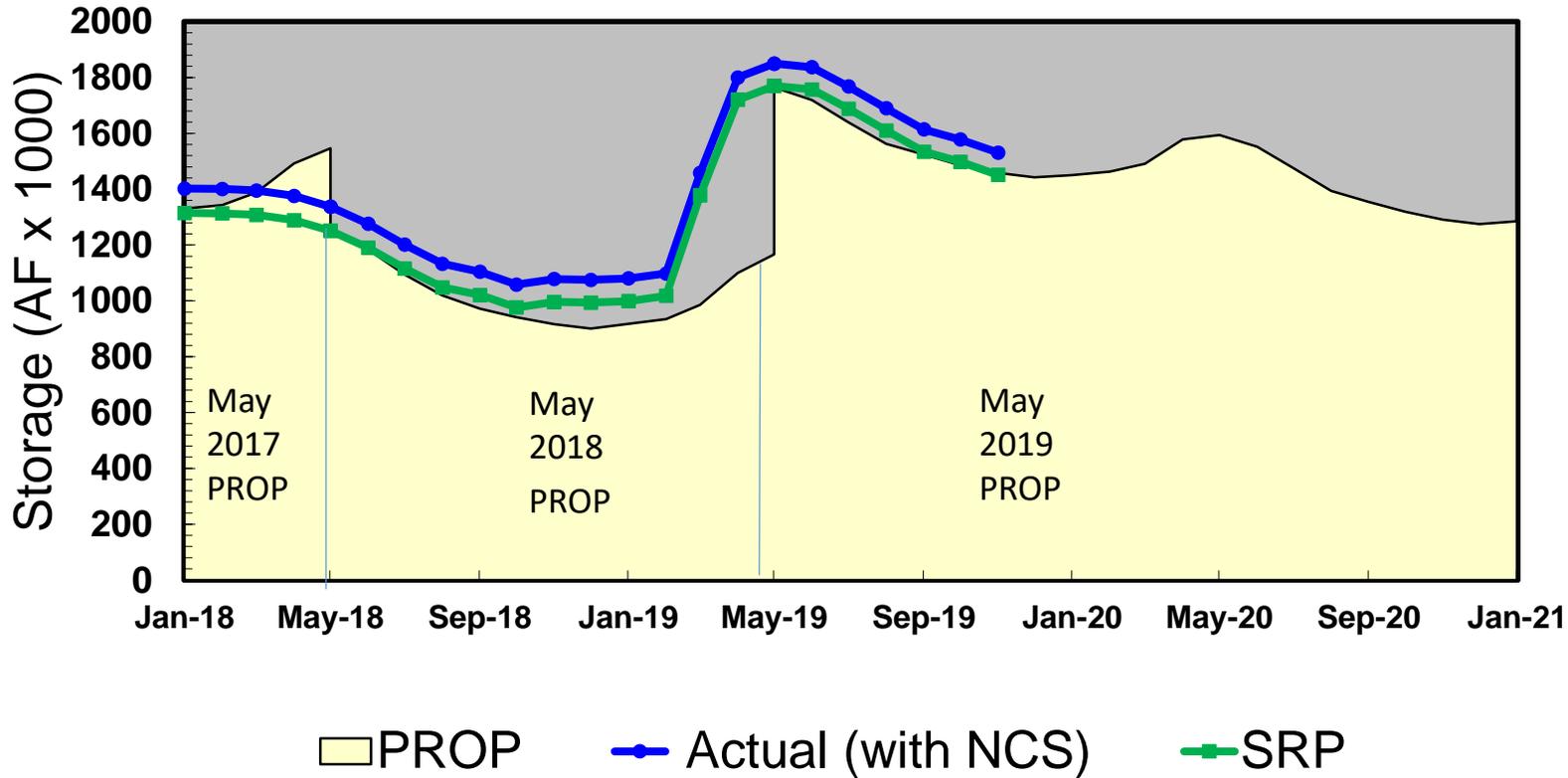
# Hydrograph for Water Year 2019



### Assumptions

- Full allocation through 2021 (Demand = 750 KAF/Year)
- Lower Quartile Runoff July 2019 through 2021
- Mix for 2020 is 3.0 SW and 0.3 GW (100 KAF GW)

### Total Storage - SRP Reservoir System

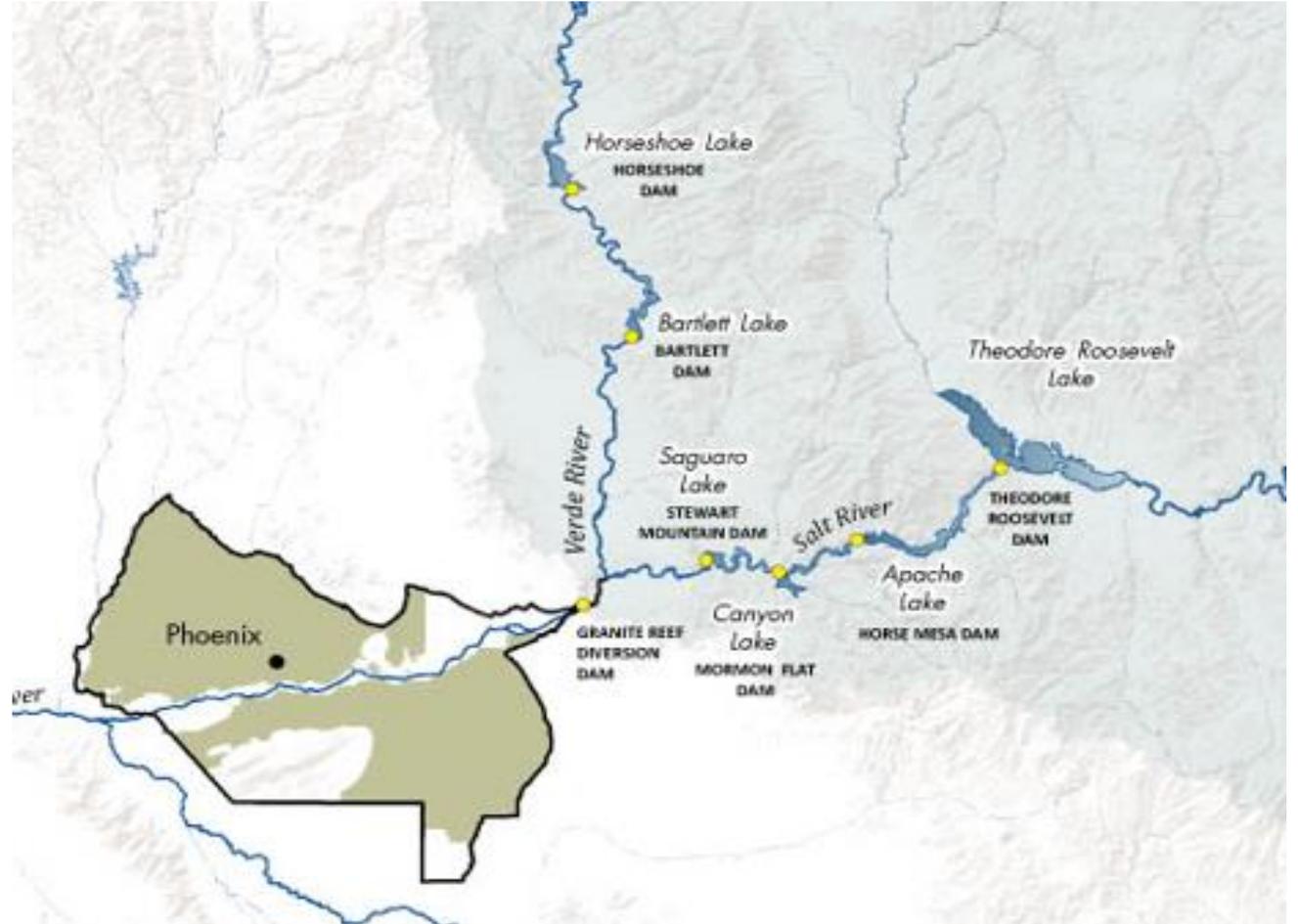


	Groundwater (AF/Year)	Surface Water (AF/Year)	Projected End of Year Storage (KAF)	Projected Percent Full (%)
2019	125,000	625,000	1450	72
2020	100,000	650,000	1295	65
2021	150,000	600,000	1145	57

# Salt/Verde River System Operations

## 2019 Fall River Swap

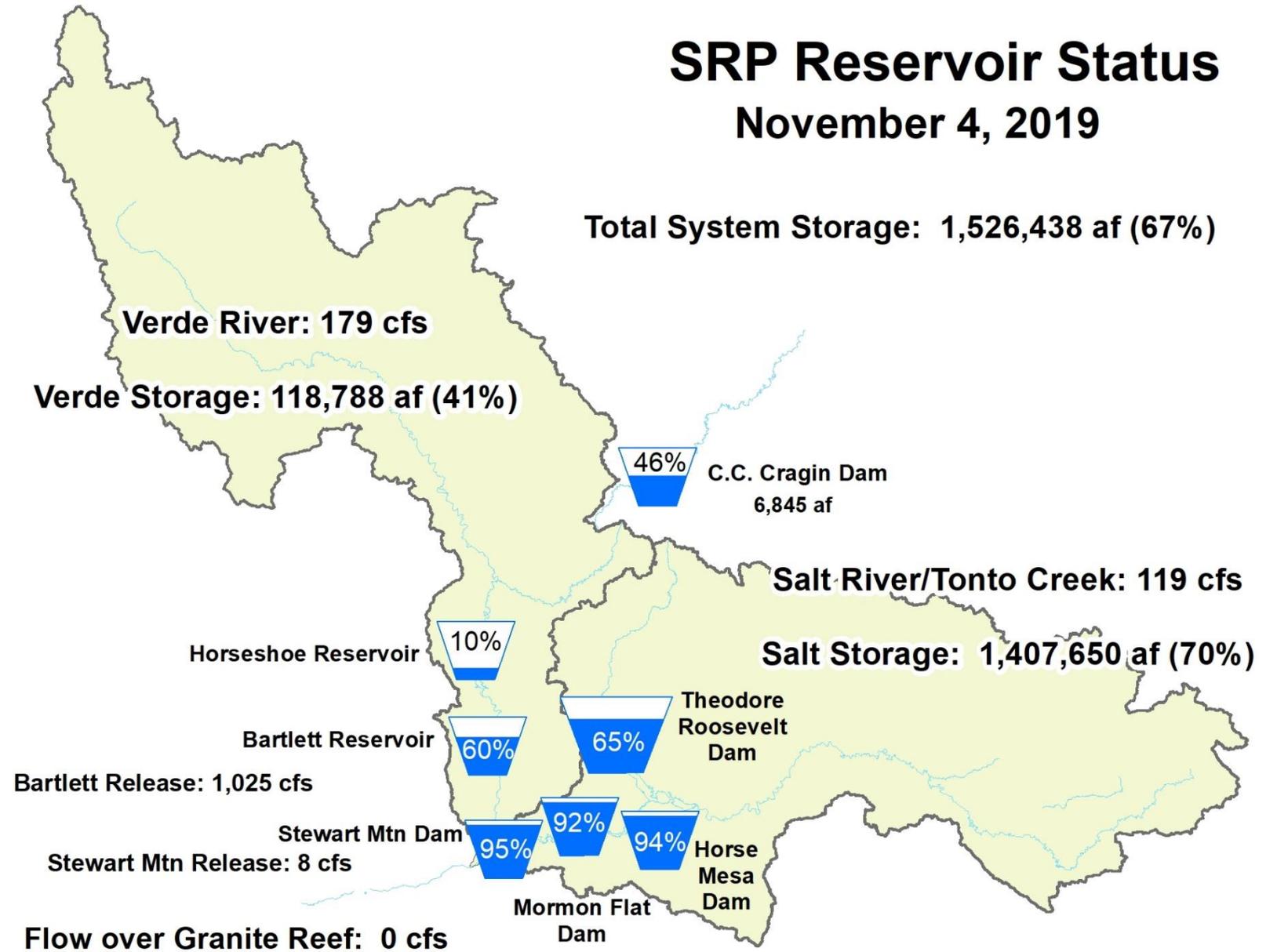
- Salt System to Verde System
- Swap Completed from October 9-12
- Water deliveries will continue on Verde (currently ~1,000 cfs) through the winter, Salt release is at 8 cfs.



# 2019 SRP Reservoir Conditions

- January 1, 2019 Storage 1,080,148 af (47%)
- Jan-May 2019 Winter Inflow of 1,121,000 af (210% of median)
- Increased total reservoir storage up to 80% full by end of May 2019.
- Monsoon 2019 Inflows of 48,269 af (45% of median)
- Reservoir Storage currently at 67%

## SRP Reservoir Status November 4, 2019

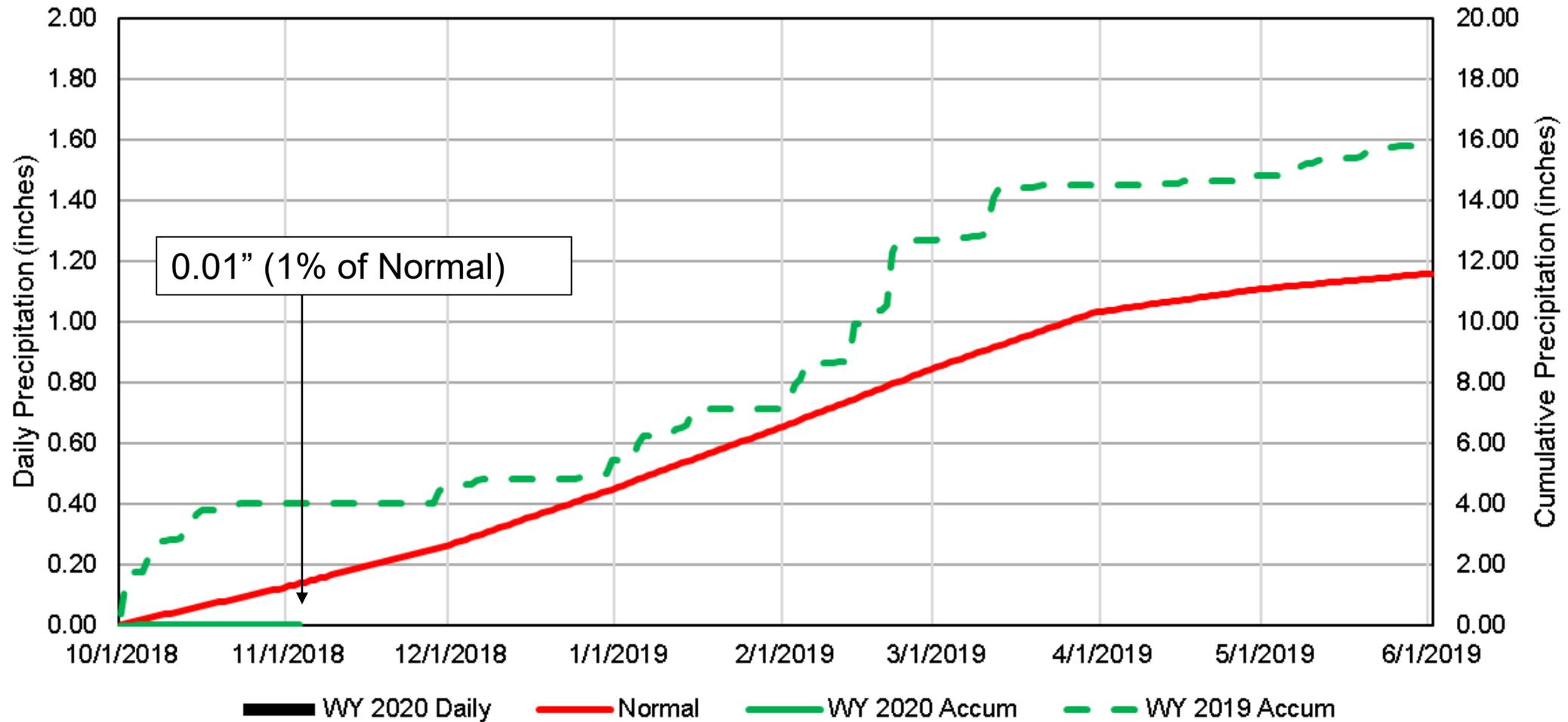


# Winter 2020 Forecast

Will It Be?

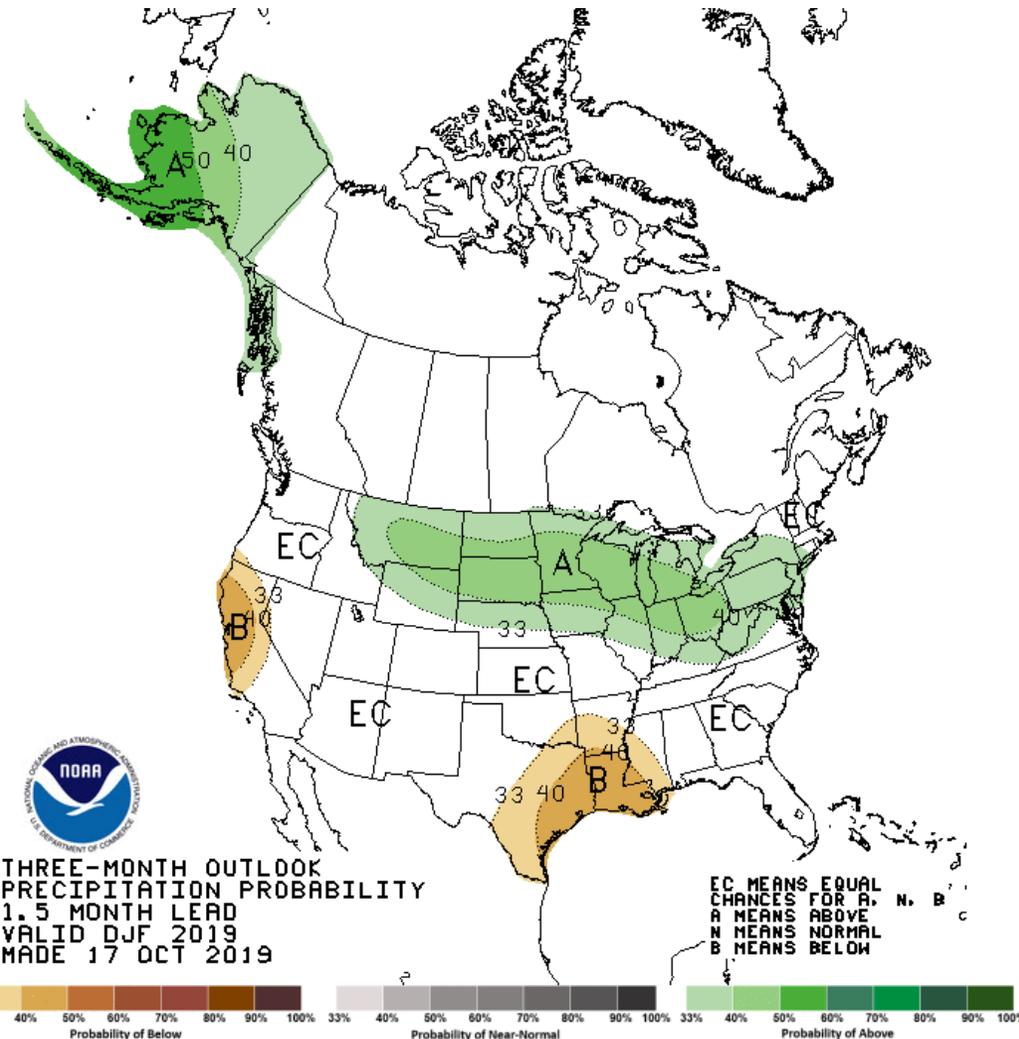
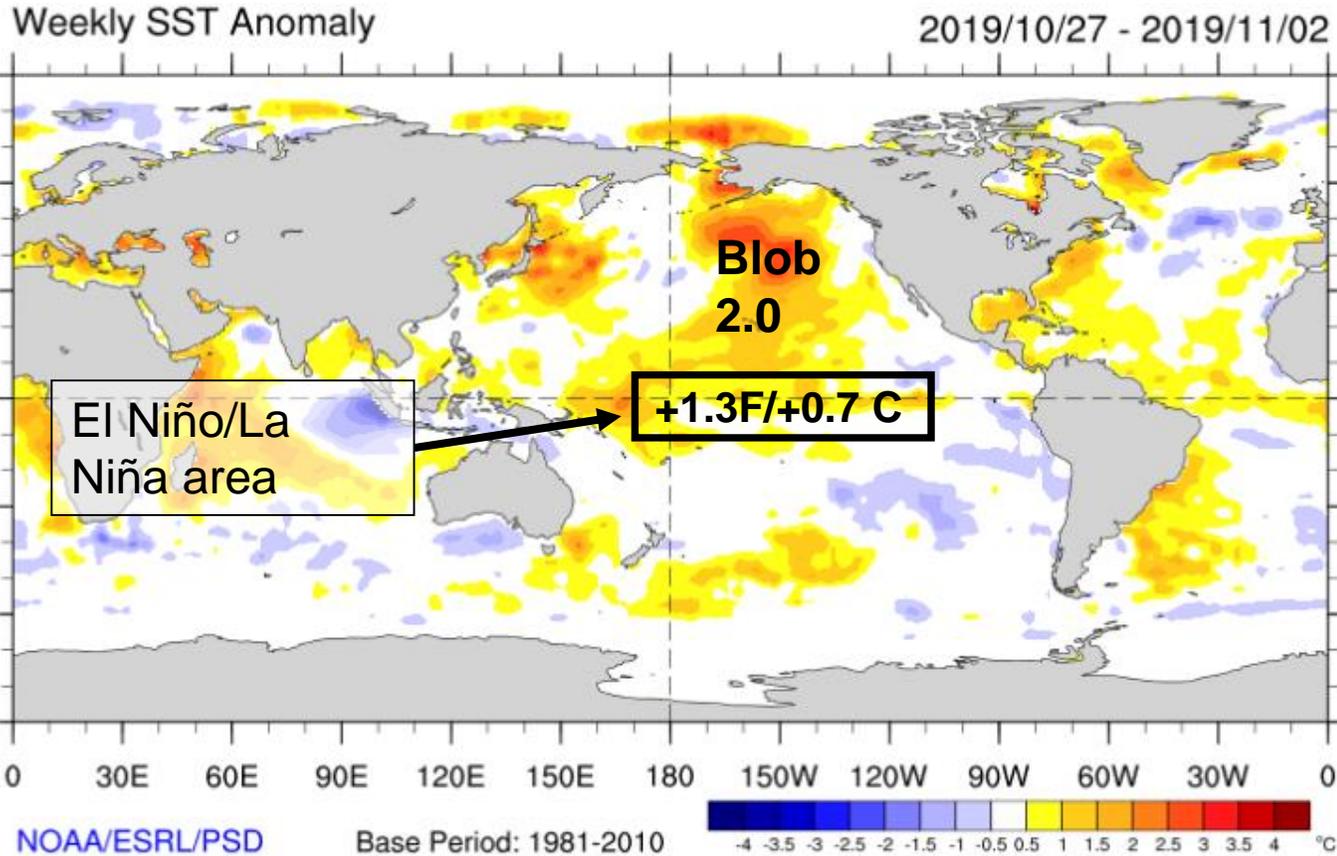


## Cumulative Watershed Precipitation: Fall-Winter-Spring (WY 2020)



# Dec-Jan-Feb

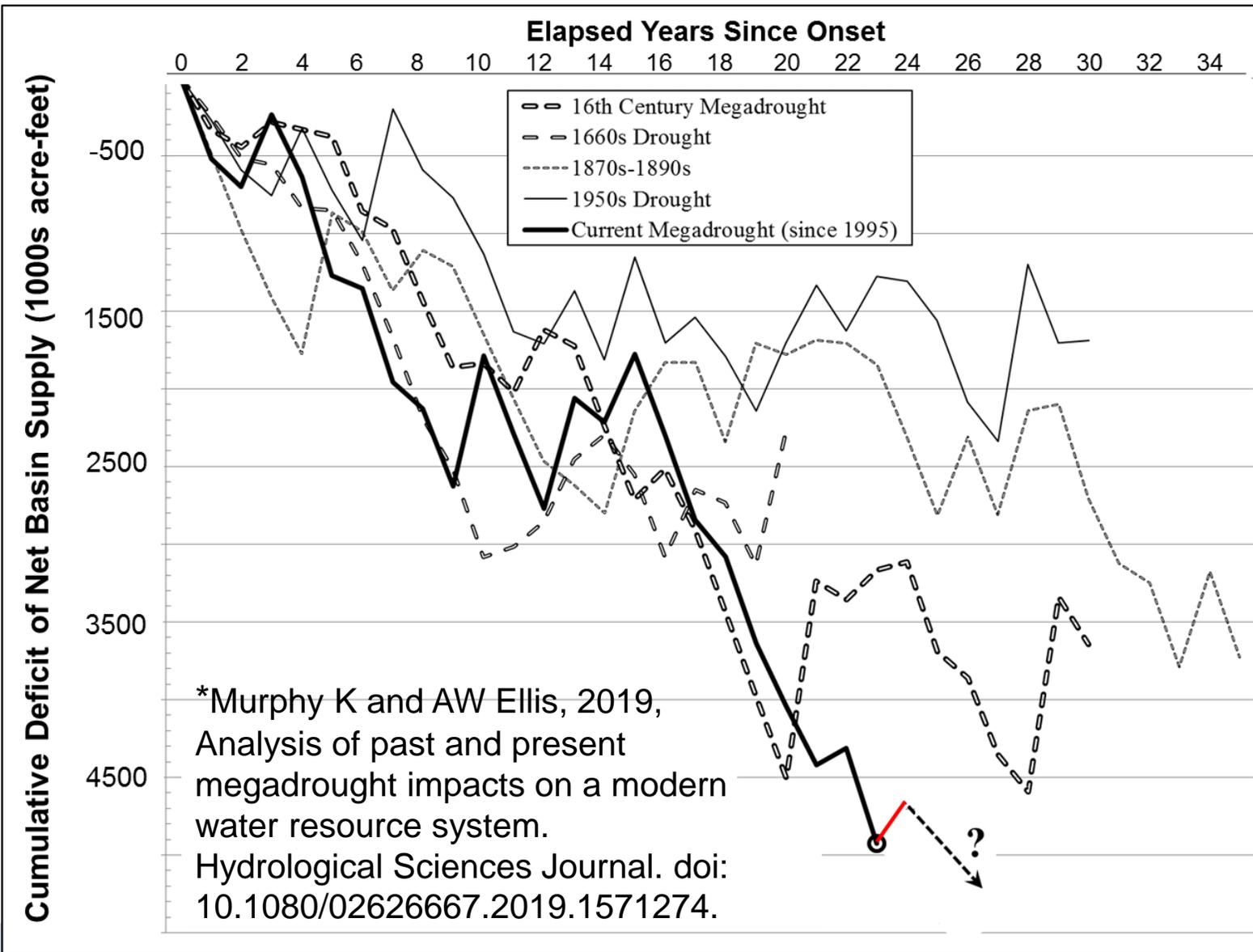
## Weekly Sea Surface Temperature Anomalies



Year	Jan-May Inflow (AF)	May 1 Storage (AF)	May 1 Percent Full
2010	1,419,000	2,311,000	100
2011	223,000	2,006,000	87
2012	196,000	1,512,000	66
2013	449,000	1,453,000	63
2014	148,000	1,300,000	56
2015	328,000	1,314,000	57
2016	338,000	1,307,000	57
2017	970,000	1,731,000	76
2018	100,000	1,337,000	58
2019	1,121,000	1,850,000	81
2020	?	?	?

2011-2018 lowest consecutive 8-year annual inflow on record

1996-2018 lowest consecutive 23-year annual inflow on record



# Mega Drought Severity

Droughts can last 20 to 35 years  
 Current megadrought is the most severe in the tree ring record\*

# Summary

- Wet 2019 Winter increased storage to 80%
- Monsoon 2019 dry but with a >1,000 year event
- Winters are most important to central AZ hydrologic drought
- 2020 winter wet or dry?





## Questions?

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